Track Triggering using Silicon Pixel Detectors

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Track Triggering using Pixels

- Goal: Develop an algorithm for finding high-momentum tracks using silicon pixel detectors

- Requirements:
  - p_T > 5 GeV (initially 10 GeV)
  - Full barrel detector coverage (but skip forward disks)
  - No requirement of regions of interest pre-defined by other trigger objects, i.e. track trigger should be standalone
  - Latency of a few microseconds
  - To be implemented in FPGAs
  - Ideally, trigger electronics should be on-detector, to avoid reading out the full detector for trigger processing
    - Design should be modular and segmented

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- Discussion of concept published:

- AVK, "*A fast method for particle tracking and triggering using small-radius silicon detectors*", Nucl. Inst. Meth. Phys. Res. A 957 (2020) 163427
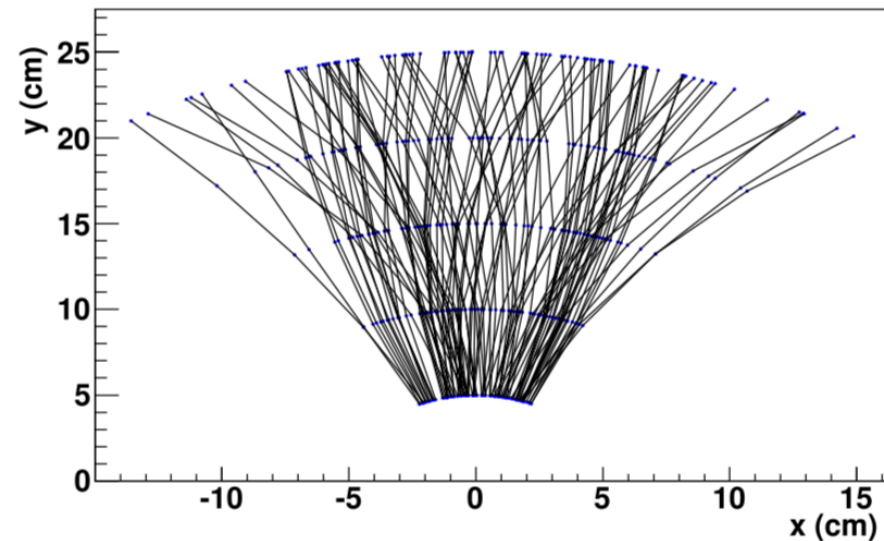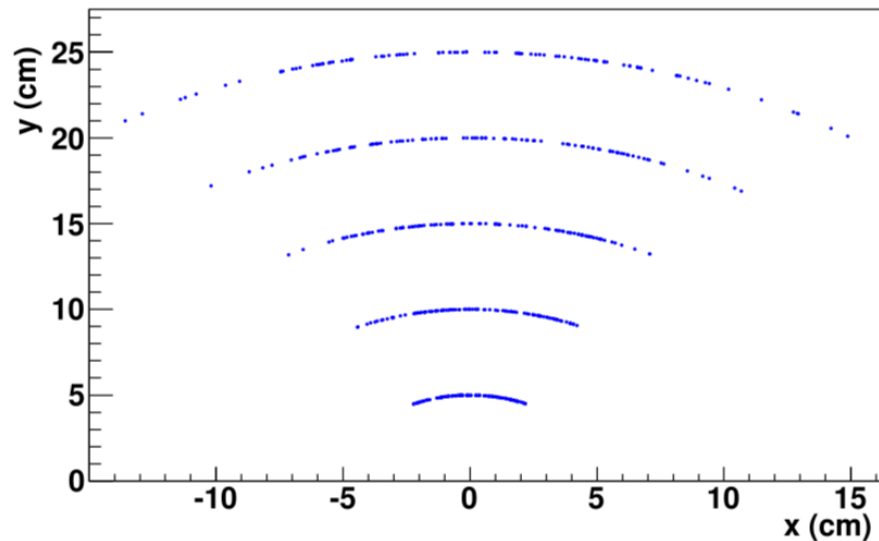
- Next steps:

  – Realistic emulation including resolution and noise hits

  – Detector segmentation

  – Optimize algorithm for speed *vs* ghost rate

  – Study FPGA hardware resource requirements using VIVADO HLS